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GLOSSARY

Glossary of technical terms in cognitive neuroscience

Roland H. Grabner · Daniel Ansari · Bert De Smedt · Minna M. Hannula

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This glossary contains technical terms in cognitive neuroscience that are used in the original articles of the present special issue. It was created based on the article authors' suggestions of relevant terms and explanations which we gratefully acknowledge.

10–20 system An internationally recognized system to determine the location of EEG electrodes on the scalp. Morphologically exactly defined marks are used and electrodes are placed in reference to them in 10 and 20% steps, respectively

3D-MPRAGE A data acquisition sequence that produces detailed, three-dimensional high-resolution structural images of the brain

AC-PC (anterior to posterior commissure) The anterior commissure (AC) and posterior commissure (PC) are two structures in the brain that are used to define the Talairach coordinate system of the human brain. The anterior commissure is defined as the origin with coordinates (0, 0, 0)

Baseline condition Experimental condition designed to provide a baseline measure of brain activity. Since fMRI measures relative states of regional blood flow, such conditions are essential. Common baseline conditions include eyes closed, or fixation (looking at a central point or cross with eyes open)

Block Group of experimental trials

Block design An fMRI design in which trials of each experimental condition are presented in separate blocks. Different experimental conditions are measured in blocks of trials and the activation associated with these blocks is then analysed

BOLD (blood oxygenation level dependency) Oxygenated and deoxygenated hemoglobin differ in the magnetic susceptibility and thus represent a natural contrast agent in fMRI. The ratio of oxygenated to deoxygenated hemoglobin changes

R. H. Grabner (✉)
Institute for Behavioral Sciences, Swiss Federal Institute of Technology (ETH) Zurich,
Universitätsstrasse 41, UNO C15, 8092 Zurich, Switzerland
e-mail: grabner@ifv.gess.ethz.ch

D. Ansari · B. De Smedt
Numerical Cognition Laboratory, Department of Psychology,
University of Western Ontario, London, Canada

B. De Smedt
Department of Educational Sciences,
KatholiekeUniversiteit Leuven, Leuven, Belgium

M. M. Hannula
Department of Teacher Education,
University of Turku,
Turku, Finland

due to an increase in local blood supply and oxygen consumption caused by increases in neural activity (e.g., in association with a cognitive demand). These BOLD signal changes are measured in fMRI studies and represent an indirect measure of neural activity

BA (Brodmann area) Brodman divided the cortex into areas which differ from one another in the cell types and microscopic organization. This differentiation has been used as a basis for characterizing and labelling different cortical regions. Areas are numbered from 1 to 52

Cerebral cortex The outermost layer of the brain. In humans it is 2–4 mm thick and has a convoluted topography, created by sulci and gyri. It is often classified into four lobes, the frontal, parietal, temporal, and occipital lobe. The cerebral cortex plays a key role in cognitive processes, e.g., memory, language, attention, consciousness

Cluster threshold A method for controlling inflation of false positives due to the fact that in a given contrast statistical comparisons are calculated for every voxel, thus resulting in a large number of statistical tests within the same experiment

Cognitive resources Cognitive resources are defined by the amount of activation of the nervous system that is potentially available to an individual for information storage and processing

Condition An experimental condition is one of several variations in the independent variable, which is expected to produce a change in the dependent variable

Contrast A contrast refers to a difference in brain activation between experimental conditions

Electroencephalography (EEG) A neurophysiological method that uses electrodes to measure the electrical signals on the scalp which are caused by firing of the neurons. Typically, it offers a high temporal but poor spatial resolution

Event-related design An fMRI design in which the independent variable is varied on a trial-by-trial basis, with variable intervals between trials. Unlike block designs, event-related designs allow estimating the activation associated with single events, rather than groups (blocks) of events

Functional acquisition cycle A sequence in which images of the brain are captured. Functional refers to a scanning protocol that favours the measurement of moment-to-moment changes in brain activation, rather than anatomical details

Functional magnetic resonance imaging (fMRI) A brain imaging technique that is based on the measurement of the BOLD signal. This widely-used method allows the imaging of brain activity with high spatial but poor temporal resolution

Gaussian smoothing kernel Gaussian smoothing kernels are applied to fMRI data to remove signal fluctuations that deviate from a normal distribution. By applying Gaussian smoothing kernels, researchers ensure that the data they are modelling follow a normal distribution and can thus be subjected to parametric statistics

Gyrus A ridge in the surface of the cerebral cortex. It is surrounded by sulci

Hemodynamic response The dynamic changes of blood flow and the ratio of oxygenated and deoxygenated blood (see BOLD)

Gradient echo planar imaging sequence (EPI) A data acquisition procedure that is sensitive to the BOLD contrast and that permits very rapid acquisition of fMRI with multiple images collected at the same time

Inter-stimulus interval (ISI) Time between consecutive stimuli

MNI coordinates *x*, *y*, *z* coordinates which represent the location of a point in the brain on the Montreal Neurological Institute template, which was developed from averaging the brain scans of 305 normal right handed participants. MNI coordinates are slightly different from Talairach coordinates

Near-infrared light Light with a wavelength from about 700 to 1,400 nm that is just above the wavelength of visible light

Near-infrared spectroscopy (NIRS) A brain imaging method that uses near-infrared light to measure the concentration changes of oxygenated and deoxygenated hemoglobin in the brain. The temporal resolution is comparable to fMRI but the spatial resolution is worse

Neural efficiency An inverse relationship between task-related brain activation and behavioural performance or cognitive ability is termed neural efficiency

Pupillometry Pupillometry is the measurement of the pupil size. The pupil dilates in reaction to mental and physical efforts as well as to emotional arousal. In cognitive psychology the pupil size is mostly used as an index for the allocation of cognitive resources

Region of interest (ROI) In fMRI analysis, region of interest refers to a specified area of the brain. Its size and location can be selected according to the underlying research question, based on localizer tasks, anatomical landmarks, relevant findings from the literature, and/or activated brain regions. ROIs are defined for the purpose of further statistical analysis and/or graphic display of the data

Run A continuous sequence of scans

Saccade Rapid eye movement, executed in 200–400 ms

Scan One full acquisition of brain imaging data, which produces a three dimensional matrix of data, with voxels as the unit

Statistical parametric mapping (SPM) Statistic technique for measuring differences in brain activity between conditions. It also refers to the neuroimaging data analysis software created by the Wellcome Department of Imaging Neuroscience (London, UK)

Stimulus External event which is presented to a participant in an experiment via a particular sensory modality

Sulcus A depression or fissure in the surface of the cerebral cortex. It surrounds a gyrus

T2 image Image depicting the brain structure

Talairach coordinates *x*, *y*, *z* coordinates which represent the location of a point in the brain on the atlas published by Talairach, which was created based on post-mortem sectioning of a brain from a single person

Trial Sequence of events entailing the presentation of one cognitive stimulus or problem

Voxel Three-dimensional spatial element in brain scan data, measured in mm. For example, a 1 mm × 1 mm × 1 mm voxel is a 1 mm cube within the brain image